

WHAT IS CLAIMED IS:

1. A method of increasing the fabric protective properties of a fabric that comprises the steps of:

5 (a) depositing a composition onto the fabric in a treatment liquor wherein the composition comprises a hydrophobic agent having a melting point or glass transition temperature of less than 100°C and an effective amount of a zeta potential modifier so that the treatment liquor has a zeta potential that is positive and greater than zero
10 millivolts; and
(b) curing said fabric at a temperature above ambient temperature but less than 100 °C.

- 15 2. The method of claim 1 wherein the composition further includes a fluoropolymer.

3. The method of claim 1 wherein the treatment liquor has a zeta potential of less than about +150 millivolts.

- 20 4. The method of claim 1 wherein the treatment liquor has a zeta potential of less than about +100 millivolts.

5. The method of claim 1 wherein said treatment liquor comprises an aqueous liquor.

- 25 6. The method of claim 1 wherein said treatment liquor comprises the wash liquor of a washing machine.

7. The method of claim 1 wherein said treatment liquor comprises the rinse liquor of a washing machine.
8. The method of claim 1 wherein said step (a) is achieved through the use of one of a dispensing device, a bottle, a device to release the composition, a water soluble or water insoluble sachet, a water soluble or water insoluble package, a water soluble or water insoluble tablet, a water soluble or water insoluble powder, an aqueous liquid carrier, any one of which provides release of the composition into the treatment liquor.
9. The method of claim 1 wherein said step (a) saturates said fabric with said composition, wherein said composition is effectively diluted into the treatment liquor during use.
10. The method of claim 1 further comprising the step of rinsing said fabric prior to curing said fabric.
11. The method of claim 1 wherein the treatment liquor of step (a) comprises the neat composition.
12. The method of claim 1 wherein said step (a) comprises placing the fabric in a treatment liquor containing said composition in combination with a laundry detergent, laundry additive product, or combinations thereof.
13. The method of claim 12 wherein said step (a) comprises placing the fabric in a treatment liquor containing said composition and also an additive selected from the group consisting of emulsifiers, pH adjusters,

silicones, non-ionic surfactants, cationic surfactants, amphoteric surfactants, zwitterionic surfactants, anionic surfactants, soil release agents, soil release polymers, antistatic agents, fragrances, fragrance extenders, antimicrobial actives, preservatives, dyes, colorants, viscosity control agents, antifoaming agents, pearlizing agents, opacifying agents, antioxidants, sunscreens, dye transfer inhibitors, dye fixative agents, dispersants, chlorine scavengers, wetting agents, electrolytes, enzymes, bleaching agents, brighteners, heavy metal chelating agents, fabric softener actives, soil suspending agents, soil release agents, and mixtures thereof.

14. The method of claim 1 wherein the fabric is selected from the group consisting of natural fibers, synthetic fibers, and mixtures thereof.
15. The method of claim 14 wherein the natural fibers comprise cellulose, cotton, wool and fur and mixtures thereof.
16. The method of claim 15 wherein the natural fibers comprise cotton.
17. The method of claim 14 wherein the synthetic fibers are selected from the group consisting of polyester, polyamide, nylon and mixtures thereof.
18. The method of claim 1 wherein step (b) comprises drying the fabric at a temperature above about 45°C.
19. The method of claim 1 wherein said hydrophobic agent is 0.5 to 60 weight % of the composition.

20. The method of claim 1 wherein said zeta potential modifier is 0.1 to 30 weight % of the composition.
21. The method of claim 2 wherein said fluoropolymer is 0.5 to 60 weight % of the composition.
22. The method of claim 1 wherein said zeta potential modifier is a cationic material.
23. The method of claim 22 wherein the cationic material is a cationic surfactant selected from the group consisting of mono and di-methyl fatty amines, alkyl trimethyl ammonium salts, dialkyl dimethyl ammonium salts, alkyl amine acetates, trialkylammonium acetates, alkyl dimethylbenzyl ammonium salts, dialkylmethylbenzyl ammonium salts, alkylpyridinium halide and alkyl (alkyl substituted) pyridinium salts, alkylthiomethylpyridinium salts, alkylamidomethylpyridinium salts, alkylquinolinium salts, alkylisoquinolinium salts, N,N-alkylmethylpyrrolidinium salts, 1,1-dialkylpiperidinium salts, 4,4-dialkylthiomorpholinium salts, 4,4-dialkylthiomorpholinium-1-oxide salts, methyl bis (alkyl ethyl)-2-alkyl imidazolinium methyl sulfate (and other salts), methyl bis(alkylamido ethyl)-2-hydroxyethyl ammonium methyl sulfate (and other salts), alkylamidopropyl-dimethylbenzyl ammonium salts, carboxyalkyl-alkyldimethyl ammonium salts, alkylamine oxides, alkyldimethyl amine oxides, poly(vinylmethylpyridinium) salts, poly(vinylpyridine) salts, polyethyleneimines, trialkyl phosphonium bicarbonates (and other salts), trialkylmethyl phosphonium salts, alkylethylmethylsulfonium salts, and alkyldimethylsulfoxonium salts.

24. The method of claim 22 wherein the cationic material is selected from the group consisting of cationically modified materials including cationically modified organic polymers, biopolymers, clays, silicas, nanoparticles, and mixtures thereof.
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25. The method of claim 1 wherein said hydrophobic agent is at least partly insoluble in water at a temperature of about 20 °C.
26. The method of claim 1 wherein said hydrophobic agent is selected from the group consisting of hydrophobic waxes, polymers produced from ethylenically unsaturated monomers, low molecular weight polyethylene, low density polyethylene, polypropylene, oxidized polyethylene, oxidized polypropylene, polyolefin, polyurethane, ethyl vinyl acetate, polyvinyl chloride, co-polymers, and emulsifiable waxes.
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27. The method of claim 1 wherein the composition comprises an aqueous liquid carrier that optionally includes a low molecular weight organic solvent.
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28. The method of claim 27 wherein said aqueous liquid carrier is between 20% and 80 % weight of the composition.
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29. The method of claim 1 wherein the composition used in step (a) further comprises an additive selected from the group consisting of emulsifiers, pH adjusters, silicones, non-ionic surfactants, cationic surfactants, amphoteric surfactants, zwitterionic surfactants, anionic surfactants, soil release agents, soil release polymers, antistatic agents, fragrances, fragrance extenders, antimicrobial actives, preservatives, dyes, colorants, viscosity control agents, antifoaming agents, pearling
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agents, opacifying agents, antioxidants, sunscreens, dye transfer inhibitors, dye fixative agents, dispersants, chlorine scavengers, wetting agents, electrolytes, enzymes, bleaching agents, brighteners, heavy metal chelating agents, fabric softener actives, soil suspending agents, soil release agents, and mixtures thereof.

30. The method of claim 1 wherein the hydrophobic agent used in the composition in step (a) has a melting point or glass transition temperature between 45°C and 100°C.

31. The method of claim 2 wherein the composition used in step (a) comprises: (i) 5 to 30 weight% of a fluoropolymer; (ii) 5 to 30 weight% of said hydrophobic agent; and (iii) a liquid carrier.

32. A method of treating a fabric that is laundered that comprises the steps of:

- (a) immersing the fabric in a treatment liquor;
- (b) adding a composition comprising a hydrophobic agent having a melting point or glass transition temperature of less than 100°C; and an effective amount of a zeta potential modifier so that the treatment liquor has a zeta potential that is positive and greater than zero millivolts;
- (c) rinsing said fabric with water;
- (d) removing excess water from said fabric;
- (e) curing said fabric at a temperature above ambient temperature but less than 100 °C.

33. The method of claim 32 wherein step (a) further includes adding a detergent or a laundry additive composition, or combination thereof, to the treatment liquor.

5 34. The method of claim 32 wherein step (a) further includes adding a fluoropolymer.

35. The method of claim 32 wherein said hydrophobic agent used in step (b) is 0.5 to 60 weight % of the composition.

10 36. The method of claim 32 wherein said zeta potential modifier used in step (b) is 0.1 to 30 weight% of the composition.

15 37. The method of claim 32 wherein said zeta potential modifier used in step (b) is a cationic material.

20 38. The method of claim 37 wherein the cationic material is a cationic surfactant selected from the group consisting of mono and di-methyl fatty amines, alkyl trimethyl ammonium salts, dialkyl dimethyl ammonium salts, alkyl amine acetates, trialkylammonium acetates, alkyl dimethylbenzyl ammonium salts, dialkylmethylbenzyl ammonium salts, alkylpyridinium halide and alkyl (alkyl substituted) pyridinium salts, alkylthiomethylpyridinium salts, alkylamidomethylpyridinium salts, alkylquinolinium salts, alkylisoquinolinium salts, N,N-
25 alkylmethylpyrrolidinium salts, 1,1-dialkylpiperidinium salts, 4,4-dialkylthiomorpholinium salts, 4,4-dialkylthiomorpholinium-1-oxide salts, methyl bis (alkyl ethyl)-2-alkyl imidazolinium methyl sulfate (and other salts), methyl bis(alkylamido ethyl)-2-hydroxyethyl ammonium methyl sulfate (and other salts), alkylamidopropyl-dimethylbenzyl

ammonium salts, carboxyalkyl-alkyldimethyl ammonium salts,
alkylamine oxides, alkyldimethyl amine oxides,
poly(vinylmethylpyridinium) salts, poly(vinylpyridine) salts,
polyethyleneimines, trialkyl phosphonium bicarbonates (and other salts),
trialkylmethyl phosphonium salts, alkylethylmethylsulfonium salts, and
alkyldimethylsulfoxonium salts.

39. The method of claim 37 wherein the cationic material is selected from the group consisting of cationically modified materials including cationically modified organic polymers, biopolymers, clays, silicas, nanoparticles, and mixtures thereof.
40. The method of claim 32 wherein said hydrophobic agent used in step (b) is at least partly insoluble in water at a temperature of about 20°C.
41. The method of claim 32 wherein said hydrophobic agent used in step (b) is selected from the group consisting of hydrophobic waxes, polymers produced from ethylenically unsaturated monomers, low molecular weight polyethylene, low density polyethylene, polypropylene, polyolefin, polyurethane, ethyl vinyl acetate, polyvinyl chloride, copolymers, and emulsifiable waxes.
42. The method of claim 32 wherein the composition used in step (b) comprises an aqueous liquid carrier that optionally includes a low molecular weight organic solvent.
43. The method of claim 42 wherein said aqueous liquid carrier is between 20% and 80% weight of the composition.

44. The method of claim 32 wherein the composition used in step (b) further comprises an additive selected from the group consisting of emulsifiers, pH adjusters, silicones, non-ionic surfactants, cationic surfactants, amphoteric surfactants, zwitterionic surfactants, anionic surfactants, soil release agents, soil release polymers, antistatic agents, fragrances, fragrance extenders, antimicrobial actives, preservatives, dyes, colorants, viscosity control agents, antifoaming agents, pearlizing agents, opacifying agents, antioxidants, sunscreens, dye transfer inhibitors, dye fixative agents, dispersants, chlorine scavengers, wetting agents, electrolytes, enzymes, bleaching agents, brighteners, heavy metal chelating agents, fabric softener actives, soil suspending agents, soil release agents, and mixtures thereof.
45. The method of claim 32 wherein the hydrophobic agent used in step (b) has a melting point or glass transition temperature between 45 °C and 100°C.
46. The method of claim 32 wherein the composition used in step (b) comprises: (i) 5 to 30 weight% of a fluoropolymer; (ii) 5 to 30 weight% of said hydrophobic agent; (iii) 0.1 to 30 weight% said zeta potential modifier, and; (iv) a liquid carrier.
47. The method of claim 32 wherein the fabric is selected from the group consisting of natural fibers, synthetic fibers, and mixtures thereof.
48. The method of claim 47 wherein the natural fibers comprise cellulose, cotton, wool and fur and mixtures thereof.

49. The method of claim 47 wherein the synthetic fibers comprise polyester, polyamide, nylon and mixtures thereof.

5 50. A method of increasing the water repellency properties of a fabric that comprises the steps of:

(a) depositing a composition onto the fabric in a treatment liquor wherein the composition comprises a hydrophobic agent having a melting point or glass transition temperature of less than 100°C and an effective amount of a zeta potential modifier so that the treatment liquor has a zeta potential that is positive and greater than zero millivolts; and

10 (b) curing said fabric at a temperature above ambient temperature but less than 100 °C, wherein increasing the water repellancy of said fabric comprises increasing the initial water contact angle to an angle greater than 0 degrees.

15 51. The method of claim 50 wherein said initial water contact angle of step (b) is greater than 30 degrees.

20 52. The method of claim 50 wherein said initial water contact angle of step (b) is greater than 70 degrees.

53. The method of claim 50 wherein said initial water contact angle of step (b) is greater than 100 degrees.

25 54. A method of increasing the oil repellency properties of a fabric that comprises the steps of:

(a) depositing a composition onto the fabric in a treatment liquor wherein the composition comprises a hydrophobic agent having a

melting point or glass transition temperature of less than 100°C, an effective amount of a zeta potential modifier so that the treatment liquor has a zeta potential that is positive and greater than zero millivolts, a fluoropolymer; and

(b) curing said fabric at a temperature above ambient temperature but less than 100 °C, wherein increasing the oil repellancy of said fabric comprises increasing the initial oil contact angle to an angle greater than 0 degrees.

55. The method of claim 54 wherein said initial oil contact angle of step (b) is greater than 30 degrees.

56. The method of claim 54 wherein said initial oil contact angle of step (b) is greater than 40 degrees.

57. The method of claim 54 wherein said initial oil contact angle of step (b) is greater than 70 degrees.

58. The method of claim 1 wherein said fabric protective properties of the fabric are increased without effectively decreasing the breathability of said fabric.

59. The method of claim 58 wherein said breathability of the fabric is not decreased below about 0.40 grams of water in column as measured by the breathability test.

60. The method of claim 1 or 2 wherein said fabric protective properties increased by said method comprise increasing both the initial water

contact angle and the initial oil contact angle to angles both greater than 0 degrees.

- 5 61. The method of claim 60 wherein said initial water contact angle is greater than 30 degrees and said initial oil contact angle is greater than 30 degrees.
- 10 62. The method of claim 60 wherein said initial water contact angle is greater than 70 degrees and said initial oil contact angle is greater than 40 degrees.
- 15 63. The method of claim 60 wherein said initial water contact angle is greater than 100 degrees and said initial oil contact angle is greater than 70 degrees.
- 20 64. The method of claim 60 wherein said fabric protective properties further comprise improved handfeel, improved softness and improved resistance to damage.
- 25 65. The method of claim 60 wherein said fabric protective properties increased by said method comprise increasing soil, stain and particulate soil repellency, and combinations thereof.
66. The method of claim 60 wherein said fabric protective properties of the fabric are increased without effectively decreasing the breathability of said fabric.

67. The method of claim 66 wherein said breathability of the fabric is not decreased below about 0.40 grams of water in column as measured by the breathability test.

5 68. A method of treating fabrics in a washing machine to increase the fabric protective properties of said fabric, comprising the steps of:

(a) depositing a composition onto the fabric in a treatment liquor wherein the composition comprises a hydrophobic agent having a melting point or glass transition temperature of less than 100°C and an effective amount of a zeta potential modifier so that the
10 treatment liquor has a zeta potential that is positive and greater than zero millivolts; and

(b) curing said fabric at a temperature above ambient temperature but less than 100 °C;

15 wherein said composition optionally includes a fluoropolymer, and wherein said fabric protective properties comprise increased water repellancy, increased oil repellancy, improved handfeel, improved softness, improved resistance to damage, and any combination thereof.

20 69. The method of claim 68 wherein the treatment liquor of step (a) comprises the wash liquor, the rinse liquor, or both.

70. The method of claim 69 wherein said composition of step (a) further comprises an additive selected from the group consisting of emulsifiers,
25 pH adjusters, silicones, non-ionic surfactants, cationic surfactants, amphoteric surfactants, zwitterionic surfactants, anionic surfactants, soil release agents, soil release polymers, antistatic agents, fragrances, fragrance extenders, antimicrobial actives, preservatives, dyes, colorants, viscosity control agents, antifoaming agents, pearlizing

agents, opacifying agents, antioxidants, sunscreens, dye transfer inhibitors, dye fixative agents, dispersants, chlorine scavengers, wetting agents, electrolytes, enzymes, bleaching agents, brighteners, heavy metal chelating agents, fabric softener actives, soil suspending agents, soil release agents, and mixtures thereof.